

We are also indebted to Hermite for the first proof that e , the base of the Napierian logarithms, is transcendental, a result which paved the way for Lindemann's proof that the same is true of π .

In 1862 Hermite was elected to a newly founded chair at the École Normale, and later on he also became professor at the École Polytechnique and the Sorbonne. Instead of continuing to teach on the old lines which he found still in vogue, Hermite introduced into his lectures the great discoveries of Gauss, Abel, Jacobi and Cauchy. He thus founded for France a new school of higher geometry, and the large number of mathematicians of distinction who have studied under him bear abundant testimony to the success of his innovation.

During the later period of his life Hermite appears to have directed his attention more especially to questions connected with the calculus. In conjunction with Darboux and Jordan, he presented the general theory of linear differential equations in an entirely new light, choosing the algebraic rather than the geometric method of presentation. His work on Lamé's equation leads to the solution of a large number of problems in applied mathematics.

The "Cours de M. Hermite" constitutes an important work on the theory of functions.

About eleven years ago Hermite delivered an inaugural address before the President of the French Republic, which was published in the *Bulletin des Sciences mathématiques* for January 1890. In 1892 he celebrated his jubilee, and it is remarkable that the same year witnessed also the jubilee of Pasteur. The new century and the new era in history which has come upon our country will both be the poorer for the loss of M. Hermite, but his works will be handed down to posterity.

An account of his work has been given in the *Comptes rendus* for January 21 by M. C. Jordan, himself the author of important papers on the fields of study which Hermite had chosen to work in. To this account we are indebted for much matter contained in the present notice, and we are glad that M. Jordan pleads for the publication of Hermite's collected works. Many of his ideas are scattered in journals or letters that are difficult of access, and it will be of inestimable use to mathematicians to have them printed in book form. G. H. B.

ADOLPHE CHATIN.

ADOLPHE CHATIN died on January 13 at the age of eighty-seven. He was a native of Dauphiné, and was born at Ile-Marianne-de-Saint-Quentin, near Tullins, "d'une famille peu fortunée," according to M. Gaston Bonnier, from whose éloge in the *Comptes rendus* of the Paris Academy (January 21) some of the following facts of his life-history are taken. He received his early education at Tullins, and at seventeen joined an apothecary at Saint-Marcellin. Three years later (1833) he went to Paris under an apothecary named Briant, who, recognising his pupil's capabilities, urged him to study pure science as well as pharmacy. Chatin, who always gratefully remembered his good friend's advice and encouragement, worked to such effect that he took bachelors degrees both in Letters and Science, and six years after his arrival in Paris obtained the degree of Doctor of Science. In the next year, 1840, he read his thesis before the School of Pharmacy, and was duly admitted. The somewhat ambitious title of this thesis, "The Comparative Anatomy of Plants applied to Classification," indicated the line of work in which he has done most service to botany. It was a short paper dealing with the occurrence, structure and general properties of albumen in plant-seeds. He took the view that the presence of endosperm in the seeds, implying a temporary arrest in the embryogeny of the plant, indicates a lower condition than that existing in the exalbuminous seed.

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"From this time," he tells us in the introduction to the "Anatomie Comparée des Végétaux," "comparative anatomy was (with plant symmetry) the principal object of my labours."

In 1844 he took the degree of Doctor of Medicine, and in 1848 was elected to the chair of Botany at the School of Pharmacy, his chief competitor being M. Payer. Twenty-five years later he became Director of the School, retiring in 1886 with the title of Honorary Director. In 1874 he was chosen a member of the Academy of Science, succeeding Claude Gay, and in 1897 became President of the Academy. He was also a member of the Academy of Medicine, and filled various other posts of honour.

His first memoir, published in 1837, was on the symmetry of structure of plant organs, and sixty years later appeared the last part of his studies on the symmetry of the vascular bundles of the petiole. His best-known work is the "Anatomie Comparée" (1856-1862), which was never completed. It consists of two parts, the larger illustrated by 113 plates, on Dicotyledonous Parasites, the smaller with 20 plates, on Aquatic Monocotyledons. It is difficult to estimate the value of this work. Its chief worth lies in the beautifully executed figures illustrating the anatomy of the stem, leaf and root of a large number of genera and species. Their preparation implies considerable skill and much hard, conscientious labour, with which the results, as embodied in the text of the book, are scarcely commensurate. But it is hard to judge the work of forty years ago from our present standpoint, and in helping to revive the study of plant-anatomy, which had fallen into neglect, Chatin did good service, and might well, in his later years, regard with some complaisance and pride its present important position as one of the factors in the evolution of a natural system of plant-classification.

Chatin also studied the organogeny of the flower, especially of the andrœcium, and collected the results of numerous small papers, which had previously appeared in the *Comptes rendus* and elsewhere, in a volume entitled "De l'Anthère" (1870)—a comparative account of the development, structure and mode of dehiscence of the anther in a number of families and genera. His memoir on the life-history and structure of *Vallisneria spiralis* is a useful piece of work, illustrated with characteristic elaborate detail. But he by no means restricted himself to the study of the symmetry and anatomy of plants; the subjects of his published works and papers comprise the results of chemical as well as botanical investigations. Among his earlier papers were several dealing with the occurrence of iodine in air and water, its presence in plant tissues and its effect on plant growth. He also wrote on the potato disease, the vine disease, and on the cultivation of truffles and other edible fungi, and published a small book on watercress.

For the past two years his health, hitherto robust, had been gradually failing, and his last days were spent in retirement at his country home at Essarts-le-Roi, near Rambouillet. His son, M. Joannes Chatin, a professor at the Sorbonne and a member of the Academy, has made a few contributions to botanical literature, but his work has been chiefly in other branches of science.

NOTES.

ARRANGEMENTS are being made by the Royal Academy of Sciences of Sweden to celebrate the third centenary of the death of Tycho Brahe, the founder of modern practical astronomy, on October 24, 1901, by a special meeting. It is also proposed to further commemorate Tycho's work by the publication of a facsimile of the original edition of his celebrated "Astronomiæ instauratæ mechanica," a perfect copy of which is in the library of the Academy. It is well-known that when at Wandesburg

in the year 1598, Tycho had this work printed in his own office, with the view to give the celebrities of his time an exact idea of the organisation of the observatory which he had left for ever. But the edition appears to have been small, for the only copies of the work now known to be in existence are two at Copenhagen, and one each at the British Museum, Prague, and Stockholm. Another edition was printed four years later at Nuremberg, but it is not nearly so fine as that printed by Philip de Ohr at Wandesburg. Subscriptions are invited for the facsimile of the Stockholm copy of the work, and should be sent to Prof. Hasselberg, Royal Academy of Sciences, Stockholm, Sweden, before March 1. The price is fixed at 2*l.* a copy.

THE gold medal of the Royal Astronomical Society has been awarded this year to Prof. Edward C. Pickering, of Harvard College Observatory. The medal will be presented at the annual general meeting of the Society, which will be held at 3 p.m. to-morrow (Friday).

ON January 28 Scottish geology lost a most successful and enthusiastic fossil-collector in Mr. James Bennie, who then passed away at the ripe age of seventy-eight years. He began, while an artisan, in early life to employ his leisure hours in gathering fossils from the Carboniferous formations around Glasgow and from the Glacial deposits of the West of Scotland. So successful were these excursions and so excellent his published descriptions of the results obtained from them that in the spring of 1869 he was invited to join the Geological Survey of Scotland as Fossil Collector. He was thenceforth able to devote his whole time to work which had previously been only possible for him in his scanty hours of leisure. His career in the Survey was marked by remarkable industry, insight and success. He acquired a more minute knowledge of the palæontological stratigraphy of the Carboniferous system than was probably possessed by any one else. He discovered the first recognisable traces of *Holothuria* in that system, and obtained remains of scorpions from many different horizons. To his acute faculty of observation we owe the first recognition of the little Arctic *Apus* among the deposits of lakes of the Glacial Period in Scotland. He was not only a lynx-eyed collector but wrote well, and supplied many interesting papers to the *Transactions* of the Geological Societies of Edinburgh and Glasgow. He was fond of English literature, and when too poor to purchase Tennyson's Poems, borrowed a copy and transcribed it all. The value of his work was recognised two years ago by the Geological Society of London, which awarded him the Murchison Fund. His gentle and kindly nature, his cheery helpfulness and his loyal devotion to duty made him a great favourite with his colleagues, from whom he retired in 1897 on a well-merited pension.

AT University College, London, last week Prof. Schäfer was presented with a testimonial subscribed for by a number of those who had been his pupils or who had worked in the physiological laboratory during his tenure of office as Jodrell Professor of Physiology. From a report in the *British Medical Journal*, we learn that the chair was taken by Prof. Thane, who sketched the main features of Prof. Schäfer's connection with University College, and spoke of the esteem in which he was held alike by pupils and colleagues. The presentation was made by Dr. Leonard Hill, F.R.S., who, in a short and sympathetic speech, referred to the way in which Prof. Schäfer had stimulated physiological inquiry, and won, not only the respect, but the affection of those who were privileged to learn from him or to work under him. The presentation took the form of a bowl and two platters of hammered silver, designed and made by Mr. Alexander, of University College School, and of a cheque for a sum of money which is to be devoted to founding a medal to be given for the encouragement of physiological research in University College. Prof. Schäfer, who was very warmly

received, said that the occasion recalled to him another occasion in the same theatre some thirty years ago. He then learnt from the lips of Sharpey that he had won the medal in physiology, and received it from the hands of Huxley. He believed that that circumstance had determined him to follow physiology as a career.

DR. R. A. DALY, of the Department of Geology and Geography of Harvard University, is endeavouring to organise a geological and geographical excursion in the North Atlantic for the summer of 1901. Conditionally on the formation of a sufficiently large party, a steamer of about 1000 tons, specially adapted for ice navigation, and capable of accommodating sixty persons, will leave Boston on or about June 26 and return to the same point on or about September 20. The main object of the voyage will be to offer to the members of the excursion party opportunity of studying the volcanic cones and lava-fields, the geysers, ice-caves and glaciers of Iceland, the fiords and glaciers of the west coast of Greenland, and the mountains and fiords of Northern Labrador. Some attention will be paid to the hydrographic conditions of the waters traversed. Botanists, zoologists, ornithologists, mineralogists and persons interested in other branches of natural history may pursue independent studies. A hunting party may take part in the expedition; it could be landed for a fortnight or three weeks in Greenland and for about the same period in Labrador. Explanatory lectures on the regions visited will be given from time to time by the leader of the excursion, Dr. Daly, who will also act as guide on the Labrador coast, where he spent the summer of 1900. An inclusive fee of 500 dollars for each member will be charged, 250 dollars to be deposited with the leader of the expedition on or before March 15. Applications for membership should be addressed to Dr. R. A. Daly, Harvard University, Cambridge, Mass., U.S.A.

WE regret to have received information of the death of the Nestor of European botanists, Dr. J. G. Agardh, of Lund, who died on January 17 in his eighty-eighth year. Prof. Agardh was chiefly known for his work in marine algae. He was a correspondant of the Section of Botany of the Paris Academy of Sciences.

A NATURAL History Section has been formed of the Hampstead Astronomical and Scientific Society, with the primary object of working out the local fauna and flora. Meetings of the section will be held from time to time, when exhibits will be made, papers read, and discussion on zoological and kindred subjects invited. The honorary secretary for the section is Mr. J. W. Williams, 128, Mansfield Road, Gospel Oak, N.W.

MR. WILLIAM H. CROCKER, of San Francisco, has offered to defray the expenses of a solar eclipse expedition to be sent by the University of California from the Lick Observatory to Sumatra to observe the total eclipse of the sun on May 17. An astronomer and assistants will sail from San Francisco on February 19, to be absent until July. It is proposed to establish an observatory camp somewhere within twenty miles of Padang, on the west coast of Sumatra.

THE "Historical Number" of the *Electrical Review* of America (January 12) is full of notes and articles of interest to students of electricity. The number contains several very readable and informing papers on various branches of electrical work, and a series of portraits of men who contributed to the progress of electrical science and industry during the past century.

WE learn from *Science* that Mr. J. W. Sprague, who died recently, left a will that should ultimately greatly benefit the Smithsonian Institution. It gives 85 per cent. of the interest on

the estate to relatives for life. On their death the entire property, increased by 15 per cent. of the income to be laid by each year, is held in trust for twenty years, and then reverts to the Smithsonian Institution. One-half of the annual income is then to be added to the principal each year, and the other half is to be used for the advancement of the physical sciences by prizes, lectures or original research. It is estimated that the fund now is worth 200,000 dollars, and that it will be available in about fifty years.

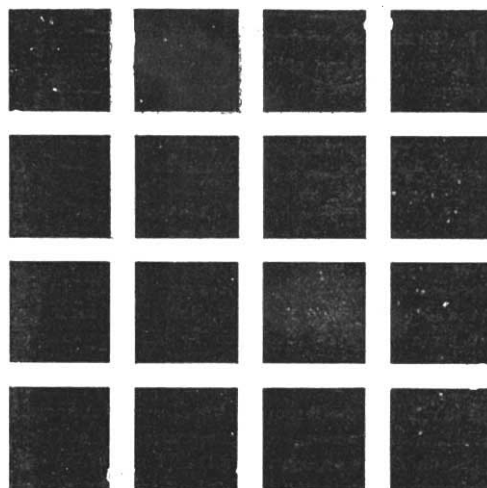
DR. NORMAN MOORE will deliver the Harveian Oration of the Royal College of Physicians of London on St. Luke's Day, October 18, and Dr. Judson S. Bury, of Manchester, the Bradshaw Lecture in November. Dr. W. H. Corfield has been appointed the Milroy Lecturer for 1902. A subscription of fifteen guineas has been voted by the College to the fund for erecting a statue of Dr. William Gilbert, a former president, in the new Town Hall of Colchester. The adjudicators of the Weber-Parkes Prize for 1900 have reported that they have been unable to find any original work, published since the last award, which in their judgment would satisfy the conditions of the trust. Dr. J. F. J. Sykes will deliver the Milroy Lectures on February 28 and on March 5 and 7, on "The Influence of the Dwelling upon Health"; Dr. H. Head, F.R.S., the Goulstonian Lectures on March 12, 14 and 19, on "Certain Mental States associated with Visceral Diseases in the Sane"; and Dr. J. Frank Payne the Lumleian Lectures on March 21, 26 and 28, on "Cancer, especially of the Internal Organs."

FREE railway transport is granted to members of the staff of the New Mexico Agricultural Station engaged in experimental work and investigation, by the principal railway companies of the territory. This, remarks Dr. F. W. Sanders in a report just to hand, will enable the station to serve the public interests more perfectly than it has been possible to do in the past. Mr. A. Goss concludes, from results obtained during three years, that a number of districts in New Mexico can produce remarkably good beets, both as to sugar content and purity. Prof. T. D. A. Cockerell, the Station entomologist, who has for a number of years interested himself in the pigments of insects and plants, refers to a red colouring matter of the roots of the small boraginaceous plant *Eremocarya micrantha*, which may prove of service the properties of the pigment. The pigment belongs to the anthocyan series, and behaves exactly like litmus, turning red in the presence of acids, blue in the presence of alkalis. It is superficial on the roots, and readily soluble in cold alcohol. This pigment is thus an excellent native substitute for litmus, and might possess commercial value. Not only is it purer than commercial litmus, but its preparation is very much simpler, and the roots are easily obtained. The matter is now being further investigated by the Division of Botany of the U.S. Department of Agriculture, and we shall doubtless be informed of the results before very long.

WE have received from Dr. Hergesell, President of the International Aéronautical Committee, an account of some preliminary results of the balloon ascents made on January 10. There were 15 ascents, including both manned and unmanned balloons; of these three started from Vienna, four from Berlin, and four from Strassburg. Altitudes varying from 4500 to 12,000 metres were attained by the unmanned balloons and some very low temperatures were registered. Three of the manned balloons ascended above 3000 metres. Several inversions of temperature with height were recorded—e.g. Vienna, 23°·7 at 500 metres, 34°·2 at 1000 metres, 32°·4 at 2000 metres; at Berlin, 25°·5 at starting, 32°·0 at 790 metres, 41°·0 at 1460 metres, 32°·4 at 2825 metres, while at 6670 metres the temperature had fallen to -22°·0. Ascents were also made at London and Bath, but the

results are not given in Prof. Hergesell's summary. One of the balloons from Berlin, with Messrs. Berson and Hildebrandt, descended in Sweden after a flight of nearly fourteen hours.

A CURIOUS optical illusion is produced by the accompanying figure from *La Nature*. At the places where the white strips separating the black squares cross one another, a hazy penumbra can be seen. If, however, attention is concentrated upon one



of these spots it disappears, though the others remain visible. It would be interesting to vary the dimensions of the squares and intervening white spaces, and thus determine when the effect ceases to be seen.

THE thermal death-point of the tubercle bacillus is the subject of an important paper by Messrs. Russell and Hastings in the "Seventeenth Report of Wisconsin Agricultural Experimental Station." The general results obtained entirely confirm the experiments of Prof. Theobald Smith (see *NATURE*, vol. lxiii. pp. 166 and 205), and are as follows:—(1) Exposure of tuberculous milk in a tightly closed commercial pasteuriser for a period of ten minutes destroyed in every case the tubercle bacillus, as determined by inoculation experiments (*i.e.* at a temperature not exceeding 68° C.). (2) When milk is exposed under conditions which would enable a pellicle to form on the surface, the tubercle bacillus may resist the action of heat at 60° C. for considerable periods. (3) In order to thoroughly pasteurise milk without injuring its creaming properties or consistency, it should be heated in closed pasteurisers for a period of not less than twenty minutes at 60° C. Under these conditions, it is certain that disease bacteria such as the tubercle bacillus will be destroyed without the milk or cream being injured in any way."

There has been considerable diversity of opinion concerning the ethnic affinities of the Slavs, and Zaborowski returns to the subject in a recent number of the *Bulletins et Mémoires de la Société d'Anthropologie* (5), I., 1900. His view is that the Slavs belong to the same race as the Celts of French anthropologists, that is, being brunet brachycephals, they are members of the Alpine race. Their original home was that which is still occupied by the southern Slavs between the Danube and the Adriatic, and they were allied to the inhabitants of the Terramara of Emilia. The northern Slavs migrated along the valley of the Vistula and reached the shores of the Baltic, where they developed a civilisation and introduced in this region the practice of burning their dead, which was previously unknown there; they also brought with them metals and glass.

Wherever the Slavs migrated they introduced the custom of incineration, and carried with them the characteristic metal head-rings, the ends of which terminated in sigmoid curves (Hackenringe). The settlement of the Venede on the Baltic dates back to the fourth century, B.C. The Baltic Slavs were profoundly affected by the expansion of the Germans about the beginning of our era, but apparently not till the eighth century A.D., did the Slavs colonise Northern Russia.

MR. R. SHELFORD, of the Sarawak Museum, has sent us a copy of his paper in the October number of the *Ibis*, describing the arrangement of the down and plumage in the embryos and young of *Centropus sinensis*—an aberrant cuckoo. Certain differences from the arrangement obtaining in the allied *C. celebensis* are noticed.

THE sixth fasciculus of vol. v. of the Memoirs of the Boston (U.S.) Society of Natural History is devoted to an elaborate memoir by Mr. R. P. Bigelow on the anatomy and development of the medusa known as *Cassiopea xamachana*. In common with the allied *Polyclonia frondosa*, this is a form specially modified for a sedentary existence in shallow water among mangrove roots.

WE have received the Report of the Museums Association for 1900, containing the account of the meeting held at Canterbury in July last under the presidency of Dr. Henry Woodward. It is satisfactory to learn that this useful association is in such a flourishing condition that it has to consider how best to spend its surplus income. The Report includes the President's address, together with twelve papers and various notes. Mr. F. A. Bather gives specimens of descriptive museum labels for certain groups of echinoderms, but the extreme technicality of these suggests that they are suited for a zoological text-book rather than for the ordinary public. A heading like "CRYPTOBLASTUS, E. AND C," is calculated to mystify rather than enlighten the uninitiated. In his address, the President dwells on the difficulty of amalgamating the recent and fossil zoological collections in the British Museum owing to the constitution of the Staff.

THE abstract of a paper by Dr. W. H. Gaskell on the origin of the eyes of vertebrates and the meaning of the second pair of cranial nerves appears in the November issue of the *Proceedings* of the Anatomical Society. After stating that the ancestor of the vertebrates possessed a pair of diverticula from the fore part of the alimentary canal with which the ganglia of the retina and the optic stalks of the lateral eyes were connected, the author pointed out that such a pair of blind diverticula exist in generalised crustaceans, such as *Branchipus* and *Apus*, adding that there is a connection between these diverticula and the retinal ganglion. It is therefore assumed that similar structures existed in the extinct trilobites. From this and other evidence it is inferred that the origin of the vertebrate eye is traceable to an animal derived from the trilobite stock, such as was abundant when the fish-like cephalaspids made their appearance.

THE horary values of the magnetic elements (declination and horizontal force) at Copenhagen, in the years 1895–1896, are given by M. Adam Paulsen in the *Annales de l'Observatoire magnétique de Copenhague*, just received from the Denmark Meteorological Institute, of which M. Paulsen is director.

THE Sanitary and Economic Association, Ltd., Gloucester, have sent us a pamphlet published by them for the purpose of promoting the economy of coal, the abatement of smoke, and

the diffusion of an elementary knowledge of the first principles of warming and ventilating generally.

PROF. S. P. THOMPSON'S interesting story of "Michael Faraday: His Life and Work," published in the Century Science Series, is now available in the popular edition at the low price of half-a-crown. The book was reviewed in *NATURE* of June 8, 1899 (vol. lx. p. 123). Messrs. Cassell and Co. are the publishers.

MESSRS. SAMPSON LOW, MARSTON AND CO. have published the sixth edition of Mr. N. E. Yorke-Davies' little book on "Health and Condition in the Active and the Sedentary." The book contains a clear statement of the laws of health, with special reference to the dietetic treatment of ailments due to errors in eating and drinking.

ONE of the most remarkable catalytic agents recently discovered is metallic nickel, reduced from its oxide at a low temperature. Two or three years ago MM. Sabatier and Senderens showed that this metal is capable of causing the direct combination of hydrogen with ethylene and acetylene, ethane being formed in both cases. In the current number of the *Comptes rendus* they now show that reduced nickel is a very active catalytic agent, so far as the addition of hydrogen is concerned surpassing even spongy platinum. Thus a mixture of hydrogen and benzene vapour, passed over reduced nickel at about 200° C., readily gives hexahydrobenzene, no benzene escaping conversion if the hydrogen is in excess. The reaction appears to be a general one, since the homologues of benzene behave similarly; nitrobenzene is reduced to aniline.

THE phenomenon of birotation of the sugars has given rise to a considerable amount of work without any very definite results being obtained. In the current number of the *Zeitschrift für physikalische Chemie* there is a paper, by Dr. Yukichi Osaka, on the birotation of *d*-glucose, which throws much light upon this subject, and forms an interesting application of the dissociation theory of solution. From the velocity constants of the change of rotation of *d*-glucose, both alone and in presence of acids, bases and neutral salts, it is shown that this sugar acts as a weak acid, the velocity of the change of rotation being proportional to the concentration of the hydroxyl ions, and to the square root of the concentration of the hydrogen ions.

THE additions to the Zoological Society's Gardens during the past week include a Sykes's Monkey (*Cercopithecus albigenalis*) from East Africa, presented by Mr. J. Coombes; two Black-necked Swans (*Cygnus nigricollis*) from Antarctic America, a Yellow-rumped Parrakeet (*Platycercus flaveolus*) from Australia, three Blue-fronted Amazons (*Chrysotis aestiva*) from South America, deposited.

OUR ASTRONOMICAL COLUMN.

VARIATIONS IN THE MOTION OF THE TERRESTRIAL POLE.—In the *Astronomical Journal* (vol. xxi. No. 489), Prof. S. C. Chandler investigates the data available for determining the changes in the annual elliptical component of the polar motion. References to these changes have been previously made in *A. J.* Nos. 422 and 446, but no decisive conclusions could then be made. The data are taken from the records at Pulkowa, Leyden, Washington, Berlin, Cambridge and Madison, and are grouped for two epochs, 1865, 1883. From each series the effect of the 427-day term of the latitude variation is eliminated after correction to a uniform value of the aberration constant and stellar parallax; from the residuals the constants of the annual term of the latitude variation are found, and finally, by combining these constants for all the series at each epoch, the elements of the ellipse are computed for 1865 and 1883.